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CHAPTER 5 *ELECTRIC POWER*

Existing Facilities

Syria is rather poorly supplied with electric power. Out of a population of 3.6 million, only 1.4 million live in towns and villages supplied with electricity and of these only about half actually use it. While public utilities have been increasing their capacity over the last eight years at a mean annual rate of about 17%, their total installed capacity at the end of 1953 amounted to only 34,350 KW or 44,776 KVA.[24] Most of the newer factories have found it necessary to provide their own power facilities. The industrial power plants which the mission was able to record have a total capacity of 20,135 KW. Some of these plants are connected with the public utilities. In 1953 the power supplied by public utilities amounted to 119.8 million KWH; and Damascus and Aleppo together accounted for 81% of this total. In fact, there were only six towns in Syria where the power generated by public utilities in 1953 exceeded a million KWH. It may be roughly estimated that factories consumed about 43 million KWH of the power generated by their own plants. Thus the total supply of electricity during 1953—about 163 million KWH—was equivalent to only 46 KWH per inhabitant, an amount comparable to that in Turkey, but 41% of that in Lebanon and about half that in Algeria and French Morocco.

At present public utilities have great difficulty in meeting their peak load. No reserve capacity exists. In Aleppo and Damascus surcharges discourage power consumption during peak hours. Since many of the large industrial power consumers have their own power plants, the public utilities generate primarily for lighting. The latter accordingly cannot balance power requirements for industry and lighting and thus tend to have an exaggerated peak load, which increases the cost of power generation. Costs are further raised by the fact that generating units are below the capacity required for economical operation. It should also be noted that

[24] See Annex G, p. 410.

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nearly all of the power is produced by diesel units which are comparatively expensive to operate. At the end of 1953 the public utilities had no steam plant and only 14% of their capacity consisted of hydro plant. The geographic dispersion of cities and low power consumption has made anything approaching a national grid impossible. Only the cities of Homs and Hama are interconnected through the Ghajar hydro plant.

Future Requirements

In principle it would be desirable to provide for a considerable acceleration of the rate at which the capacity of public utilities has been growing. The objectives of an expansion program should be to meet increasing power requirements, to permit factories gradually to shift to public utilities as a source of power, and to provide a margin as a reserve against breakdowns. Limitations on available resources, however, make it impossible to undertake a very ambitious program in the years immediately ahead. Capital must be carefully allocated. At this juncture in Syria's development, for example, it is more important to improve the water supply for communities and for agriculture than to provide more electricity for lighting.

In formulating its recommendations on power the mission has assumed in the first instance an expansion in the consumption of power supplied by public utilities at about the same rate as in the period 1949-53, namely an average annual increase of 14%. This would entail a rise in capacity from 44,776 KVA in 1953 to 106,000 KVA at the end of 1960. We consider, however, that a further increase of at least 25,000 KVA is necessary to provide a small reserve against breakdowns. This program does not specifically provide for a transfer of industrial power demand to the public utilities but, with the somewhat slower growth in industrial production which we anticipate, factories should be able to draw a little more on public utilities, at least in the off-peak hours.

Plants scheduled for completion in 1954 account for an additional capacity of 14,610 KVA. Among these are a 12,500 KVA steam plant for Damascus and a 1,350 KVA diesel plant in Homs. To meet the balance of the need, the mission recommends the installation of the following facilities by the end of 1960:

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Type and location of facility	Capacity (KVA)	Estimated cost (millions of £S)
For Damascus		
Deir Makaren and Hameh hydro plants	12,500	6.0
Souk Wadi Barada hydro plant	8,000	4.5
For Aleppo		
Steam plant	31,250	16.5
For Homs-Hama-Ghab area		
Diesel plant at Jisr ech Choghour	2,500	1.5
Diesel plant at Hama	2,500	1.5
Transmission line, Hama-Ghab-Jisr ech Choghour		3.0
For Latakia		
Diesel plant	2,500	1.5
Nahr el Kebir hydro plant	2,500	5.0
For Deir ez Zor		
Diesel plant	2,000	1.0
For small towns		
25 small diesel units	5,500	4.7
Improvements in existing plants and distribution	2,500	1.5
Total	71,750	46.7

If this program is completed, the public utilities will have a total capacity of about 130,000 KVA, of which about 21% will be hydro and approximately 33% steam power. The increase in the proportion of hydro and steam power should make possible some reduction in generating costs. It should be noted that the cost of this program—about £S 47 million—does not represent all of the expenditures on power for the period 1955-60. Some £S 14 million will also have to be found to compensate the foreign stockholders of the Aleppo and Damascus public utilities companies which were nationalized in 1951.

In this program the mission has not provided for the hydro plant that could ultimately be installed at the Youssef Pasha dam or for the hydro plants which might be established in connection with the development of the Ghab. With the installation of 75,000 KW capacity at Youssef Pasha, some 400 million KWH of firm power and 120 million KWH of secondary power could be generated. In the discussion of irrigation, however, the mission has already set forth the reasons for deferring this project, which ultimately should prove desirable. No provision has been made for the Ghab plants since these are due to be installed after 1960. Plans for the

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MAP 7

ELECTRIC POWER IN SYRIA

Area	Present Capacity	Authorized or under Construction	Mission Program	Total KW 1960
DAMASCUS	23,000	7,000	10,000	40,000
ALEPPO	10,400	10,000	15,000	35,400
HOMS-HAMA	3,750		2,000	5,750
JISR ECH CHOGHOUR			2,000	2,000
LATAKIA	500		4,000	4,500
DEIR ES ZOR	840		1,500	2,340
SMALLER TOWNS AND VILLAGES	6,560		6,000	12,560
TOTAL	45,450	17,000	40,500 a/	102,950 b/

a/ 51,250 KVA. b/ 131,138

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377 development of the Ghab call for the eventual installation of four hydroelectric works with an aggregate capacity of 18,240 KVA. Two of these will be seasonal in their operation. In general the mission would question the advisability of hydro plants which are likely to furnish little firm power in relation to the installed capacity. For this reason, for example, the mission has omitted from the recommended program the project for a 3,125 KVA power plant which would operate for only a small part of the year on the water periodically drained from the Roudj.

Distribution of Additional Capacity

Most of the expansion must obviously take place in Damascus and Aleppo, which are the focal points of rising power demand. With the completion of the steam plant, the public utility in Damascus now has a capacity of 29,000 KVA. The Souk Wadi Barada hydro plant on which construction is beginning will raise this to 37,000 KVA by the end of 1955. While this may be enough to meet the peak load anticipated for 1960, the mission considers it advisable, particularly in view of the condition of the Damascus diesel plant, to provide some reserve capacity by installing hydro plants at the two dams at Hameh and Deir Makaren which the mission proposes should be constructed in any event to provide additional irrigation in the vicinity of Damascus. This appears to the mission a more economical solution than the addition of another unit to the new steam plant. The mission has not taken into account the plan to provide Damascus with power from a hydro plant to be installed on the Yarmuk river on the Syrian-Jordanian border. While a Syrian-Jordanian agreement provides for joint development of the Yarmuk river for power and irrigation, the plans have not yet reached an advanced stage. Moreover, the mission believes that the Yarmuk power may well be too costly in view of the need for transmission over a considerable distance and for a thermal plant to stabilize the power coming from this source.

In Aleppo power requirements have been growing more rapidly than in Damascus, and the power shortage is also more acute. Construction of a new steam plant of 12,500 KVA has just begun and will raise available capacity to around 27,500 KVA. Since the peak load anticipated for 1960 will probably require a capacity of 42,900 KVA, the mission believes it imperative that the new steam plant be expanded in two further stages to provide an additional capacity of 18,750 KVA.

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Latakia, which now has only an old diesel plant with a capacity of 800 KW, must have additional capacity to meet its rapidly growing requirements. The most immediate need can be met by the construction of a 2,500 KVA diesel plant. This can later be supplemented by the installation of a hydroelectric plant at the site of the dam on the Nahr el Kebir which the mission has recommended as part of the irrigation program.

Deir ez Zor, the center of the developing Euphrates river valley and the fifth largest city in the country, also urgently needs a new 2,000 KVA diesel plant. The existing plant has a capacity of only 915 KVA.

The reclamation of the Ghab will generate a considerable increase in general activity in that region and an attendant expansion of power requirements. To meet this need the mission suggests the installation of new diesel plants of 2,500 KVA each in both Hama and Jisr ech Choghour. It would be advisable to connect these plants with a transmission line running through the Ghab and capable of supplying power for construction throughout this area and for the villages en route. Jisr ech Choghour in particular will become the center of construction activity. The mission is aware that plans for the Ghab call for the installation of a 6,250 KVA hydroelectric works at this location. The power from this plant, however, will not be firm and is in any event not likely to become available soon. The mission considers therefore that a diesel plant which can be quickly constructed is necessary to meet the immediate requirements.

For the smaller towns and villages the mission has proposed only a modest program involving some improvements in existing plants to raise their capacity, and the installation of 25 small diesel units with an individual capacity of 200 or 250 KVA. The more rapid electrification of villages and small towns should, in our opinion, be postponed for the time being in favor of more urgent programs.

Government Direction and Supervision

To carry out the recommended expansion program it will be necessary to strengthen the Directorate of Electricity in the Ministry of Public Works. This directorate was established in 1953 to coordinate the development of electricity in Syria and supervise the construction and operation of power plants. The mission recommends that the directorate be provided with a staff of 10 trained engineers to enable it to carry out its functions adequately. Separate sections should be organized for the technical

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and administrative supervision of public utilities. Supervision ought to be concentrated primarily on the utilities of the small towns and villages which are often substandard in their equipment and operation and are most in need of technical guidance in standardizing and improving their equipment. In addition to discharging its supervisory functions, the directorate should work out long-range plans, including a properly phased plan for the establishment of a power network which would be helpful in determining the location and size of power plants to be established in the future.

Electricity Rates[25]

As power production increases, there will no doubt be considerable pressure to lower the rates now charged for electricity. The mission encountered much complaint about their present level and structure. The rates charged for lighting in the principal cities do not, however, appear excessive by comparison with other countries. Electricity prices in the small towns and villages, on the other hand, are very high, but the generation of electricity by small diesel units and exclusively for lighting is inevitably rather expensive. The rates charged for electricity used as power are definitely higher than in many other countries. In Syria the power rates are often compared unfavorably with those in Lebanon in particular.

Nevertheless, the mission strongly advises against a general reduction of electricity rates over the next five or six years. An adequate supply of electricity is more important at this time than lower prices for electricity. The profits of the public utilities must be safeguarded so that the needed expansion program can be financed from their own resources. This is particularly true of the nationalized utilities of Damascus and Aleppo which have been earning considerable profits. With the anticipated increase in power generation and some reduction in costs of production, the mission anticipates that the net operating income of these utilities exclusive of depreciation allowances may reach a total of £S 60 million over the six-year period 1955-60. Most of this sum will be needed to finance expansion and pay the indemnities for nationalization. In this way the government will be able to conserve the resources derived from taxation and to borrow for other urgent requirements.

[25] See Annex G, p. 422.

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ANNEX G *NOTES ON ELECTRIC POWER*

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Energy Resources

Coal, oil and lignite resources are apparently lacking; and the calorific value of the small peat deposits is low and unutilizable. The potentialities of hydroelectric power are limited by the low volume and gradient of the rivers, the almost total absence of falls or rapids and the wide variations in seasonal flow. Only the Youssef Pasha site, on the Euphrates, has considerable possibilities for power generation. It is estimated that at this location there could be developed a firm power of 45,000 KW and a maximum of 90,000 KW. It is doubtful whether power potential on all other rivers together exceeds 60,000 KW, so that Syria's total estimated hydroelectric potential is approximately 150,000 KW—about the same as that of the Lebanese project of Litani alone.

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PUBLIC UTILITIES

Installed Capacity

In 1953 the installed power capacity was as shown in Table 1.

TABLE 1 Installed Power Capacity, 1953

	Installed power		Peak load
	KW	KVA	KW
Damascus	13,000	16,500	13,160
Aleppo	10,400	15,050	10,040
Homs-Hama	2,650	3,510	2,650
Latakia	800	1,000	800
Deir ez Zor	840	915	840
Small towns and villages	6,660	7,801	6,544
Total	34,350	44,776	34,034

These data indicate that the average load factor was 40%.[1]

[1] The load factor is the ratio of the average load in KW supplied during a designated period to the peak or maximum load occurring in that period.

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Power Generated

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The amount of power generated by the public utilities and bought by them from private plants during the last five years is shown in Table 2.

TABLE 2 Power Generated and Purchased by Public Utilities, 1949–53

(*Million KWH*)

	1949	1950	1951	1952	1953
Damascus	31.55	35.25	36.91	40.19	47.58
Aleppo	25.74	33.47	36.36	43.05	49.14
Homs-Hama	9.36	10.33	11.07	12.60	13.71
Latakia	1.02	1.21	1.50	1.75	2.25
Deir ez Zor	0.86	0.94	1.06	1.25	1.54
Small towns and villages	1.81	2.81	3.67	4.46	5.63
Total	70.34	84.01	90.57	103.30	119.85

Breakdown of Supply and Consumption

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The distribution of power consumption by various uses and the total power supply are shown in Table 3.

TABLE 3 Supply and Consumption of Electricity

(*Million KWH*)

Principal public utilities[a]	1947	1948	1949	1950	1951	1952	1953
Light	17.89	22.27	27.90	33.70	37.82	44.25	52.04
Power	15.30	18.42	22.28	27.64	28.47	31.44	36.43
Traction	4.11	4.16	4.23	4.19	3.99	4.10	4.32
Losses and miscellaneous	9.74	11.31	14.22	15.76	16.52	19.00	21.45
Total	47.04	56.16	68.63	81.28	86.80	98.79	114.24
Private industrial plants[b]	3.6	5.0	7.2	10.0	15.0	n.a.	n.a.
Estimated total supply in Syria	57.0	70.0	85.0	95.0	105.0	n.a.	n.a.

[a] Including power purchased from private plants.
[b] Excluding power sold.

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377 Table 4 shows actual increases for the years 1947-52 and 1947-53.

It should be noted that consumption of electricity for lighting has risen more rapidly than that for power. Owing to this factor and the installation of additional equipment, the peak load has risen and the load factor has declined. This is particularly true of the small towns and villages where electricity is consumed almost exclusively for lighting.

TABLE 4 Increases in Power Consumption

(*Percent*)

	1947 to 1952		1947 to 1953	
	Total	Yearly average	Total	Yearly average
Light	147.3	19.9	190.9	19.5
Power	105.5	15.5	138.1	15.5
Losses and miscellaneous	95.2	14.3	120.5	14.1
Total	110.0	16.0	140.9	15.7

377 655 *Investment in Public Utilities*

No accurate data are available on the sources of financing during the period 1946-54, but it seems that before the Nationalization Law of 1951 the large power companies financed their development projects from their own resources and with foreign capital, whereas the government helped the smaller municipalities and villages with loans. Since 1950 progress has depended exclusively on government financing and the current revenues and accumulated resources of the power companies, but it is difficult to trace in the total loans to municipalities those amounts actually used for power development. The list of loans made by the Banque de Syrie et du Liban with the authorization of the government during the last five years includes a specific loan of £S 10 million allocated to public utilities, and the financial statements of the Damascus and Aleppo public utilities each mention loans to £S 7 million, although in the latter case the loan was for all four of the utilities' operating branches—electric power, water supply, streetcars and buses.

Moreover, although in addition to the equipment purchased abroad, a

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quantity of used and army surplus equipment was utilized in the smaller towns and villages, complete records of these operations are not available.

The best assessment the mission can make of power investment in Syria is to start with the conservative cost estimate of £S 450 per KVA for diesel-driven sets, and £S 7.5 million for the only steam plant in Syria with transmission lines and transformer stations. On this basis the cost of the 46,000 KVA of the former and 12,500 KVA of the latter, added to £S 1 million for the Amir Ghajar hydro turbine generators and £S 2 million for development of the networks, give a figure of about £S 25 million. This should, however, be taken as an indication of the order of magnitude rather than as an approximation of actual investment.

II INDUSTRIAL POWER

A statement of present and expected power consumption in the leading Syrian industries is necessary for an assessment of the anticipated power requirements of the country as a whole. The factories discussed below rely mainly upon their private power supplies, a situation which is likely to change somewhat as additional public utility projects are completed.

Cement

The two cement factories at Damascus and Aleppo are among the most important industrial power consumers. In 1953 their output was 171,000 and 72,000 tons, respectively; it is expected that output will rise to 253,000 and 150,000 tons by 1955. At an average consumption rate of 90 KWH per ton, this total of 403,000 tons would require about 36 million KWH.

To meet the 1953 demand for about 22 million KWH the two factories had plants of 4,600 and 3,000 KW capacity, respectively. The Damascus factory, unlike that in Aleppo, is connected with the public utilities network, thus permitting the future transfer of cheap hydroelectric power from the projected Barada plant. The Aleppo plant may insure itself against a breakdown of its own equipment through a link with the steam plant now under construction, but as soon as cheap hydro power becomes available from the Youssef Pasha project, it can be assumed that the factory will turn to the public utilities network for at least part of its power requirements.

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Textiles

The entire output of yarn is spun in the large factories but almost half the cloth produced is woven on hand looms.[2] It is estimated that on a basis of 1.3 KWH per kilogram for spinning and 1.0 KWH per kilogram for weaving, the total power requirements of mechanized textile plants approximate 21.1 million KWH annually.

Most of the large factories (with one important exception) generate their own power from their total installed capacities of 2,200 KW in Damascus and 2,500 KW in Aleppo. This is more than adequate for the demands of the larger spinning and weaving factories, estimated at 15.8 million KWH, though some plants do in fact purchase some power—to the extent of about 2.6 million KWH—from the public utilities network. On the assumption that the power used by the small factories is drawn wholly from municipal supplies, the total power consumption of 21.1 million KWH for textile spinning and weaving is furnished by private plants to the extent of 13.2 million KWH, and by the public utilities to the extent of 7.9 million KWH. The 6.6 thousand tons of cloth at present woven on hand looms may be regarded as a potential power demand for 6.6 million KWH from the public utilities, giving an aggregate potential demand by textiles for a minimum of 27.7 million KWH, of which 14.5 million KWH would be supplied by the public utilities.

It is expected that the textile industry will continue to expand, though possibly at a slower rate, requiring about 2 million additional KWH by 1960.

Ginning

In 1953 about 50,000 tons of lint were produced and ginned in Syria. With an average power consumption of 100 KWH per ton of cotton ginned and baled, this would require about 5 million KWH.

Four-fifths of the gins are located in Aleppo, the remainder being in Homs, Idlib, Latakia and Damascus. The most important ginning factory in Aleppo has its own power plant with a capacity of 1,500 KW, but the majority of the other plants have recourse to the public network. It can be assumed that about half the total required power is supplied by private plants and half by the public utilities.

[2] 1952 production: yarn, 9,000–10,000 tons; cloth, 14,000–15,000 tons.

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An increase of about 60% in cotton production is expected by 1960, but present power capacity appears adequate to meet this expansion.

Glass

The Damascus glass factory owns a 600-KW power plant. The total productive capacity of the factory is about 43 tons of glass per day; in 1953 about 3,000 tons of glass were actually produced, representing about 70 days output at full capacity. If a consumption of about 100 KWH per ton of glass is assumed then the generated power in 1953 would have been about 0.3 million KWH.

Cold Storage

A cold storage plant in Damascus has a 500-KW power plant interconnected with the public utilities network. It can be assumed that about half of the approximately 2 million KWH required annually is supplied by the public utilities and half by the factory's plant.

Oil Mills

Two Aleppo oil mills have private power plants, the larger with a capacity of 1,200 KW, the smaller with 300 KW. These factories work only about 150 days per year (say six days per week during six months). With one-third of the capacity in reserve and an assumed load factor as low as 10% the power generated per year would be about 1.5 million KWH.

Flour Mill

A flour mill in Aleppo has a 400-KW plant. With a utilization of two-thirds of the capacity for 6,000 hours the power generated would be about 1.2 million KWH.

Sugar

In 1953 the Homs sugar factory processed 7,000 tons of sugar from beets and refined 22,000 tons from raw sugar. Power required for the former

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377 257 was stated to average 72 KWH per ton (this is very low compared with the 120-150 KWH generally required for this process); power for refining would not exceed 20 KWH per ton. The factory's 2,000 KW steam generators are interconnected with the public utilities network, allowing about 250 KW to be supplied or received according to the relative needs and availabilities in the two systems.

The above figures on beet and raw sugar processing indicate (at 72 and 20 KWH per ton respectively) that some one million KWH were generated for these purposes in 1953, exclusive of power supplied to the Homs-Hama network.

It is anticipated that sugar beet extraction will increase from 7,000 tons to some 20,000 tons by 1960, requiring an additional one million KWH.

Dyeing

377 386 The Hama dyeing plant's 435 KW generators are not connected with the public utilities network. The power generated by this plant in 1953 is estimated at about 0.6 million KWH.

Conclusion

377 The power generated by private factory power plants in 1953, equal to about one-third of that generated in the plants of the public utilities, was therefore distributed approximately as follows:

	Million KWH
Cement factories	22.0
Textile factories	13.2
Ginning factories	2.5
Glass factory	0.3
Cold storage plant	1.0
Oil mills	1.5
Flour mills	1.2
Sugar factory	1.0
Dyeing factory	0.6
Total	43.3

Future power requirements will be largely conditioned by the development of the cement, textile and beet industries, for which, as indicated

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above, additional power to the extent of approximately 14.2 and one million KWH respectively will probably be needed. The other industries specified are not expected to need substantial additional amounts of power.

On these assumptions the output of the private power plants would need to increase from about 43 million KWH to some 60 million KWH by 1960, but it is more than likely that at least part of the necessary increase will in fact be drawn from the public utilities network.

III THE MISSION'S PROGRAM

The period 1949-53 showed a mean annual increase of 14.2% in the generation of public power. The actual percentage of increase over the preceding years was as follows:

1950	1951	1952	1953
19.4	7.8	14	16.2

The figure for 1951 reflects the effec on Syrian industry of the cotton crisis. Taking all factors into accoun, it would not be unreasonable to expect a continued average yearly increase of 14% between 1953 and 1960. On this basis about 300 million KWH would be generated in 1960 and since the load factor is not expected to improve, the peak load would probably be about 85,000 KW, requiring a minimum installed capacity of some 106,000 KVA. This means that some 60,000 KVA must be added to the approximately 45,000 KVA (34350 KW) presently available plus a reserve of 20-25%.

It is believed that in 1945 there was a total installed capacity of about 13,000 KVA, able to generate 10,400 KW. During the eight succeeding years the increase was about 31,776 KVA, or 23,950 KW—an increase of some 245% or an average rate of 17% per year. Although this has not been sufficient to keep pace with rising consumption demands, it would lead to a total installation of 130,000 KVA if continued until 1960. This would give a margin of 23% over the anticipated minimum peak load for that year, which should be quite satisfactory for a country where there is practically no interconnecting network and where a large number of small generators is the rule (e.g., 18 in Damascus for an installed power of 16,500 KVA, and seven in Aleppo for 15,000 KVA). On the principle that

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371 each network should have in reserve a capacity equal to that of the largest
377 generator, Syria's present reserve requirements would total about 10,000 KVA, equal to 22% of total installed power. The reserve requirements have not been met in the past, although the situation will be greatly improved by the addition of the 14,610 KVA scheduled to start operating during 1954.

Damascus

In the Damascus area the annual increase in consumption has averaged only 10.8% over the last five years. It seems, therefore, that the peak load is unlikely to exceed 30,000 KW by 1960. This would call for a capacity of about 37,000 KVA, compared with the 16,500 KVA installed at present. The new Hameh steam plant, due to start operating at the end of 1954, would raise present capacity to 29,000 KVA and when the Souk Wadi Barada hydroelectric plant is completed in 1956 total installed power will be 37,000 KVA. In view of the fact that the Damascus diesel plant is 22 years old, the mission recommends that additional capacity of about 12,500 KVA (10,000 KW) be added to provide an adequate reserve.

There are three possible ways to provide the additional capacity. One is to install an extra set of 12,500 KVA in the new Hameh steam plant. Another is to construct new hydroelectric plants; and a third is presented by the possibility that a beginning will shortly be made on the Yarmuk power project by the Jordan Government, in which case, under the terms of an agreement with Jordan, Syria would receive 5,000 KW annually in return for an investment of 5% of the cost of the project. But to supply the balance of 5,000 KW to meet the needs of Damascus would require the installation of an additional set of 5,000 KW in the Hameh steam plant and the laying of a transmission line to the Yarmuk plant. This would cost about £S 15 million and would be the most expensive of the three choices. Of the remaining alternatives, the mission considers construction of hydroelectric plants preferable, since the need is for peak power rather than a large and steady output. Elsewhere the mission has recommended construction of reservoirs for irrigation purposes at Deir Makaren and Hameh, and it recommends that hydroelectric plants with a capacity of 10,000 KW be located at these two points, thus harnessing the power which can be developed on the Barada by construction of the two dams.

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These plants would supplement the Souk Wadi Barada project. They should cost only about £S 6 million.

Aleppo

Aleppo's consumption has grown far more speedily than that of Damascus. It is estimated that by 1960 the peak load in the Aleppo area will be about 32,175 KW, requiring an installed capacity of about 42,900 KVA.

The present installed capacity of 15,000 KVA is 27,900 KVA short of the 1960 target. Since construction of the Youssef Pasha hydroelectric plant will start as soon as funds become available, making it inadvisable to overequip Aleppo with thermal plants, no provision was made for a reserve.

The mission recommends the installation in the new steam plant not only of the first stage of 12,500 KVA, but of a second stage of 12,500 KVA and eventually a third stage of 6,250 KVA. The total cost of the second and third stages would be around £S 9 million. Some difficulties might arise toward 1960 but conditions should not be worse than at present. If consumption develops in the manner anticipated, profits from the steam plant will be large enough to give the Youssef Pasha project an earlier start.

We have considered the proposal that the additional thermal plant be located at Homs rather than Aleppo and that a transmission line be built to link such a plant with Aleppo. It has been argued that a plant at this location would provide standby and "peaking" capacity for both Aleppo and Damascus when Syria's hydroelectric resources, including those at Youssef Pasha, are developed and a national grid can be constructed. In addition, fuel oil at Homs would be cheaper and a more plentiful and cheaper supply of water would be available. While the arguments in favor of Homs appear persuasive, we have nevertheless recommended that the plant be built at Aleppo. It would be rather risky to erect a power station at a distance of 190 kilometers from the city it is designed to serve. Moreover, the losses in transmission plus the annual charges on the transmission line, which is likely to require an investment of £S 7 million, will probably offset the economies in operating costs resulting from the establishment of the plant at Homs.

Homs-Hama and the Ghab

The Homs-Hama area is important as the nucleus of a future inter-

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371 connecting network which would extend over a large part of Syria. In 377 particular, it is expected that construction of the Ghab irrigation project will soon lead to increased activity in the area of Hama.

In the general area of Homs-Hama and the Ghab, several hydroelectric plants are proposed by the government, but none is scheduled to be begun before 1960. Even the dismantling of Amir Ghajar, which would be flooded by the Rastane dam, and its relocation at the foot of Rastane, is not scheduled to start before 1962. Most of these hydroelectric plants could operate only when water is not needed for irrigation and would therefore need to be supplemented by thermal plants of equal capacity. This is also true of the Roudj hydro plant and the Rastane siphon and hydro plant. Such projects are economical only when they can be connected with a well-developed grid system. The Homs Lake hydroelectric plant would at least have the eight cubic meters per second available to the Rastane plant even in the dry season, but the head is very low and the amount of power generated is therefore not very significant. Moreover, the mission's proposal for the Ghab area would lead to an increase of power for the Homs-Hama area. Accordingly, these projects have not been included in the mission's program.

With respect to the Ghab, the mission has the following comments. The area of Jisr ech Choghour, because of its location at the outlet of the Ghab valley and on the main road from Latakia to the interior of Syria, will probably develop rapidly during the next few years. During the construction of the Ghab project it will be a supply center and a suitable site for repair shops and material storage for the contractors. This development would be facilitated if Jisr ech Choghour were provided with adequate power and the ability to transmit part of it along the Ghab valley to supply the villages and construction contractors. This would entail the installation in Jisr ech Choghour of an adequate power plant and a transmission line along the Ghab valley to Hama, where it would connect with the Homs-Hama transmission network. Further, because of the length of the interconnection, it would be necessary to build in Hama a second power plant of about the same capacity to ensure stability. The construction of the hydroelectric plant of Jisr ech Choghour was postponed for the reason that it would have been unable to provide enough firm power. The mission recommends that diesel plants with a capacity of about 2,000 KVA each be built in Jisr ech Choghour and Hama and that a transmission line be run between these plants via Karkour, Kalaat el Moudiq, Acharneh and

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Maharda. Each of the diesel plants would cost about £S 1.5 million and the transmission line would cost £S 3 million. 371 377

Latakia

The proposed construction of an improved harbor will accelerate the development of Latakia. To meet resultant increased power demands, the mission supports the immediate construction of a diesel power plant in Latakia with an installed capacity of 2,500 KVA as first stage, at a cost of £S 1.5 million. Elsewhere the mission recommends the construction of a multi-purpose reservoir on the Nahr el Kebir for flood control, power, water supply and irrigation. For these reasons, the construction of the Nahr el Kebir power plant is included in the mission's program with an equipment of 2,500 KVA as first stage, at a cost of £S 5 million. These figures are approximate because the studies of this project have not yet been completed and therefore no accurate data are available.

Deir ez Zor

The growth of Deir ez Zor will follow upon the agricultural development of the lower Euphrates valley. In this town the mission supports the immediate construction of a diesel plant with an installed power of 2,000 KVA at a cost of about £S 1 million for the first stage.

Other Areas

It can be assumed that even at a conservative estimate consumption by the 49 smaller towns and villages which now have electricity will increase at the rate of at least 15% per annum, requiring the generation of about 16 million KWH by 1960. In view of the fact that the peak load already utilizes the full power capacity, additional equipment will be needed to meet the demand.

The mission therefore supports the program for the construction in the small towns and villages of 25 new networks, 10 with an installed power of 285 HP each and 15 with 225 HP, aggregating about 5,500 KVA; total cost would be £S 4.7 million. The mission also recommends the installation of about 2,500 KVA at a cost of approximately £S 1.5 million to carry on the program of improving existing utilities.

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IV ELECTRICITY TARIFFS

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As stated in the Main Report, tariffs for electricity used for lighting of houses and shops are not excessive, except in the small towns. They range from about 16 to 25 piasters per KWH, *or* about 4.5 to 7.0 U. S. cents;[3] in the small towns they are on the high side of the range and are said to be as high as 50 piasters per KWH in some places. Sometimes the tariff takes the form of a uniform charge. In Damascus, however, the tariff was until recently on a downward sliding scale, the charge varying inversely with consumption; since 1953 it has been on a two-step progressive basis, the heavier consumers paying more. The change in tariff structure was made as a protection against an exaggerated peak load but has had the unfortunate effect of discouraging use of electrical appliances by small consumers. While such a policy may be justified as long as demand exceeds supply, as soon as installed power measures up to demand the Damascus tariff policy should be revised to encourage domestic consumption.

Charges for electricity for power vary with the area, the subscribed power and the consumed power. The range is between 4.66 and 18 piasters per KWH, the low rate of 4.66 piasters applying only to high utilization of subscribed power in the area of Homs-Hama where there is a hydroelectric plant. The average rate is between 10 and 12 piasters per KWH. Surcharges are imposed on consumption during peak hours. To all these rates, a municipal tax of 10% is generally added.

These rates are high compared with charges in other countries. Table 5 compares the rates paid by an Aleppo industrial consumer with those paid by comparable consumers elsewhere.[4]

Many Syrian consumers complain about the cost of electricity in comparison to the lower rates applicable in neighboring countries in general and in Lebanon in particular. The mission is not in a position to judge whether the basis on which charges are fixed in Lebanon is sound. However, Lebanon has the advantages of a hydroelectric power output equal to more than half of the total power supply (compared with less than 25%

[3] Prices of electricity (in U. S. cents per KWH) for monthly lighting consumption of 15 KWH (1951): New York, 6.33; Zurich, 8.15; Paris, 4.65; London, 5.80; and Colombo, 8.30. (SOURCE: International Bank's Mission to Ceylon.)

[4] Rates for other countries are at the 1951 level.

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in Syria), proximity of most of the thermal stations to pipeline outlets, and a well-developed consumption pattern operating from an interconnecting national grid. Some of these favorable conditions will be present in Syria in due course, although the handicap of limited natural resources will remain. The fact that many power users are unsatisfactory consumers, in that they provide a very low load factor, also contributes to high power costs in Syria. The most extreme illustration is provided by seasonal industries, such as ginning, which require large investments in power capacity for only a few months' consumption each year. In such cases the return would be very poor if power were sold at specially low rates for so limited a period.

TABLE 5 Comparative Industrial Power Rates

(U.S. cents per KWH)

	30 KW, 200 hours per month	300 KW, 250 hours per month
New York	4.19	2.40
Aleppo	2.53	2.22
Zurich	2.35	1.27
London	1.79	1.59
Colombo	1.80	1.30

According to the profit and loss accounts provided by the public utilities of Damascus and Aleppo, the gross return per KWH sold in 1953 was 13.6 piasters in Damascus and 12.8 piasters in Aleppo. The costs of operation of the power plants, including maintenance and repairs but excluding financial charges, were 3.18 piasters per KWH for Damascus and 4.82 piasters for Aleppo. The lower figure for Damascus is due mainly to the fact that about one-third of all power is generated in hydroelectric plants, but also to the higher efficiency of the diesel equipment. The operating costs in the hydro plants are only about 0.4 piasters per KWH sold, compared with 4.5 piasters in the diesel plants. Moreover, in the diesel plants fuel represented about 66% of the total operating cost in Damascus and 78% in Aleppo. The price of fuel oil and the efficiency of the diesel generator sets are therefore very material factors in the final price of electricity produced in thermal plants.

According to the accounts, the total costs per KWH sold and distributed were 7.25 piasters per KWH for Damascus and 5.35 piasters for

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365 377 Aleppo. This would mean that distribution costs would amount to 4.07 piasters per KWH in Damascus and only 0.53 piasters in Aleppo (excluding financial charges). This large difference can be partly explained by the fact that the personnel expenditures for Aleppo are exclusive of clerical and management personnel, while on the other hand the figure of £S 1.2 million quoted for Damascus is probably too high. One of the difficulties is that clerks and management personnel are common to the several activities of the public utilities—power, streetcars and water supply in Damascus, and power, streetcars, buses and water supply in Aleppo.

According to the accounts, the 1953 gross profit of the Damascus electric utilities was £S 2.4 million and £S 2.75 million for those in Aleppo, although the facts with respect to personnel costs would indicate that the true Damascus figure is higher and that of Aleppo lower. In any case these are large returns for the two public utilities even if the actual value of each were as high as £S 10 million. Not only are these public utilities self-supporting but they are able to finance at least part of the projected development schemes, a factor which has led the mission to recommend no reduction in power tariffs as long as large capital investment is needed.

As the proposed program gets under way, the replacement of diesel by steam plants will reduce the cost of fuel by about one piaster per KWH sold, since the cost of gas oil is about £S 103 per ton, compared with about £S 60 per ton for fuel oil, taking into account the decrease in efficiency. Therefore, pending completion of the Youssef Pasha project, earnings in the Aleppo area would not exceed one piaster per KWH, even when the steam plant is able to generate the bulk of the needed power.

In Damascus the increase in earnings resulting from the power development program would be about the same as in Aleppo. While savings realized by the shift from diesel to steam power would be less because the plant to be displaced in Damascus is more efficient than that in Aleppo, large economies would flow from the shift to hydroelectric power. But a large reduction in the cost of electricity for Syria as a whole can be expected only after completion of the main hydroelectric projects and construction of an interconnecting network based on the line Youssef Pasha-Aleppo.

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الانتاج

مقدار القوة الكهربائية المنتجة والباعة من قبل اهم شركات الكهرباء في الجمهورية السورية (بالوف الكيلووات الساعي)

ELECTRIC ENERGY GENERATED AND SOLD BY THE PRINCIPAL ELECTRICITY COMPANIES ('000 KWH)

Table No. 18

جدول رقم ١٨

Year and Month	الكمية المنتجة Energy Generated	Energy Sold for الكمية المباعة				
		المواصلات Trans	الصناعة Industry	الانارة Lighting	المجموع Total	السنة والشهر
1947	47,039	4,112	15,302	17,890	37,304	١٩٤٧
1948	56,180	4,163	18,420	22,268	44,851	١٩٤٨
1949	66,625	4,234	22,278	27,898	54,410	١٩٤٩
1950	81,279	4,188	27,639	33,696	65,523	١٩٥٠
1951	96,801	3,993	28,465	37,823	70,281	١٩٥١
1952	98,781	4,089	31,442	44,248	79,780	١٩٥٢
1953	114,238	4,318	36,431	52,042	92,781	١٩٥٣
1951						١٩٥١
January	8,076	332	2,791	3,804	6,727	كانون ثاني
February	6,891	304	2,494	3,285	6,083	شباط
March	7,017	343	2,150	2,896	5,389	آذار
April	6,535	327	2,131	3,001	5,459	نيسان
July	6,636	342	2,005	2,876	5,223	ايار
June	6,907	345	2,223	2,980	5,548	حزيران
July	6,808	357	2,216	3,128	5,701	تموز
August	6,911	343	2,346	2,668	5,356	آب
September	6,956	332	2,347	2,970	5,649	ايلول
October	7,416	326	2,455	3,266	6,047	تشرين اول
November	7,906	325	2,456	3,402	6,184	تشرين ثاني
December	8,740	320	2,851	3,765	6,936	كانون اول
1952						١٩٥٢
January	8,651	319	2,603	4,043	6,965	كانون ثاني
February	7,475	307	2,329	3,720	6,356	شباط
March	7,022	335	2,202	3,512	6,049	آذار
April	7,302	328	2,269	3,404	6,001	نيسان
May	7,820	344	2,542	3,260	6,146	ايار
June	7,709	342	2,586	3,568	6,496	حزيران
July	7,940	354	2,616	3,419	6,389	تموز
August	8,032	359	2,707	3,396	6,462	آب
September	7,981	352	2,676	3,585	6,613	ايلول
October	8,827	362	2,685	3,665	6,712	تشرين اول
November	9,229	336	3,033	4,162	7,531	تشرين ثاني
December	10,395	361	3,194	4,514	8,069	كانون اول

PRODUCTION.

مقدار القوة الكهربائية المنتجة والمباعة من قبل أهم شركات الكهرباء في الجمهورية السورية (بالوف الكيلووات الساعي)

ELECTRIC ENERGY GENERATED AND SOLD BY THE PRINCIPAL ELECTRICITY COMPANIES ('000 KWH)

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Table No. 18 (concld.) جدول رقم ١٨ (التتمة)

Year and Month	الكمية المنتجة Energy Generated	Energy sold for الكمية المباعة				الشهور والسنة
		للمواصلات Trams	للصناعة Industry	للانارة Lighting	المجموع Total	
1953 -						١٩٥٣
January	10,151	351	3,456	4,773	8,580	كانون ثاني
February	8,594	330	2,976	4,608	7,914	شباط
March	9,110	365	2,581	4,060	7,016	آذار
April	8,294	347	2,789	4,110	7,246	نيسان
May	8,902	362	2,616	3,787	6,765	ايار
June	8,605	362	2,899	4,123	7,384	حزيران
July	9,042	369	2,674	4,111	7,154	تموز
August	9,015	368	2,955	3,858	7,181	آب
September	8,852	360	2,729	4,248	7,337	ايلول
October	10,485	364	3,246	4,344	7,954	تشرين اول
November	11,016	359	3,720	4,728	8,807	تشرين ثاني
December	11,852	351	3,780	5,282	9,453	كانون اول

Source : Ministry of National Economy المصدر : وزارة الاقتصاد الوطني

3:Royal Institute of International Affairs U-4 (no date)1954 M1 Middle East
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248 433 of cultivation. Syrian cotton is a 'Lone Star' medium-staple variety and is of better quality than is needed for some locally-made clothes, which accounts for the fact that Syria both exports and imports cotton. There is still a long way to go before the country's cotton cultivation is as efficient as in Egypt or the Sudan, but cotton has become Syria's most important export commodity and the cotton acreage increased by no less than 800 per cent between 1945 and 1951, compared with an increase of 60 per cent and 70 per cent in Egypt and the Sudan.

241 433 Both 1951 and 1952 were bad years for olives; in the north, thousands of trees have been blighted by frost. Syria produces good fruit, especially in the oasis of Damascus, and peaches, apples, figs, plums, pears, grapes, apricots, and pistachio nuts are all grown. The most prolific vegetable crops are lentils, beans, and peas. The area under rice has been reduced by drainage schemes and Syria does not grow enough for her own needs. The famous tobacco of Latakia is grown under a monopoly which has recently been transferred from the concessionary company to the state. Silk and hemp are also cultivated and a start has been made in growing beet for the Homs sugar refinery.

231 439 234 Nearly 3 million sheep are estimated to graze in Syria with goats numbering over a million. Over 7,000 tons a year of coarse wool are exported, including about 2,000 tons a year suitable for rug-making. Cattle are of two types and, in 1950, numbered about 429,000.[1] Yoghurt and cheese and milk are consumed within the country. It is estimated that there are still over 72,000 camels in Syria and they are an important part of nomad economy. The Syrian horse and mule are still bred but in declining numbers.

185 The forests of Syria, as of the Mediterranean in general, are a survival from a period of greater rainfall coeval with the last glacial period of northern Europe. The woodcutter and the goat, war and erosion have taken their toll and trees are no longer an important part of Syrian wealth. An effort at re-afforestation is being made, and there is also a project to produce reeds for paper-making on the banks of the Euphrates.

Industry and Commerce[2]

377 In 1951 the output of electric energy was over 86 million kilowatt hours used mostly in Aleppo and Damascus. New

[1] *Statistical Abstract of Syria, 1951–2* (Damascus, 1952).

[2] For further details, see UN, Dept. of Economic Affairs, *Review of Economic Conditions in the Middle East, 1951–2*.

3:Royal Institute of International Affairs U-4 (no date)1954 M1 Middle East
SYRIA MDI

generators and new hydro-electric schemes are planned to increase the output. The Belgian company operating the tramways and electricity in Damascus and the French electricity company of Aleppo were nationalized in 1951. Consumption of industrial fuel oils has increased greatly since the war and the continuance of this increase shows that Syrian industry is still growing. Under the French Mandate, Syria did not attempt to produce goods for export, but since 1945 some Syrian financiers have tried to build up industries depending for success on overseas sales that have not, however, materialized. Industries based on local needs are likely to be the most successful because the cost of materials and labour are too high for Syria to sell competitively finished goods for which she has to import the raw materials.

The textile industry is the most important, despite a setback in 1950 and 1951 when faced with foreign competition; the industry is well managed and well equipped and employs 20,000 people in Aleppo and Damascus. In 1950 there were about 65,000 spindles for cotton in these two cities, as well as 12,000 handlooms and 3,600 power looms, with an output of 5,000 tons of yarn and 21 million metres of fabric.[1] Silk is woven on hand looms (about 60,000 metres of cloth), but there are mechanical looms for rayon (about 27 million metres) and nylon knitting-machines. Large dye-houses and many small establishments in Damascus and Homs serve the local textile industry. Production of woollen cloth rose to about 542,000 metres in 1948, since when it has declined, although it meets all local needs.

In Homs a Syrian firm has a group of modern plants including a sugar refinery (output 10,000 tons in 1951), an alcohol distillery (363 tons in 1951), and an oil extraction plant. But the refinery depends on imported raw sugar and only protection and a high retail price maintain it, nor is it yet certain that the Homs sugar will compete in price with imported refined sugar even if local beet production, which is being expanded, is used for refining. The cement factory near Damascus was extended in 1951 and now produces about 60,000 tons a year, and a new plant in Aleppo is on the way to producing 70,000 tons a year. There are many oil and soap factories of which the biggest, in Aleppo, can produce thirty tons a day. About 20,000 tons of asphalt, 1,449 million cigarettes, and 69,000 tons of tobacco are also produced near Latakia. Near Damascus

[1] Many of the statistics in this section have been obtained from UN, Dept. of Economic Affairs, *Review of Economic Conditions in the Middle East, 1951–2* and other recent UN Surveys of the Middle East.

433 The building industry expanded considerably during the post-war period. Authorized floor space in new buildings in Damascus increased from 56,000 square
339 metres in 1945, to 209,000 in 1950 and 265,000 in 1953. Output of cement rose correspondingly, from 35,000 tons in 1945 to 68,000 in 1950, 204,000 in 1953 and
323 114,000 tons during the first half of 1954. This fully meets local demand. A glass factory, with a capacity of 10,000 tons, established in the post-war period, reached a maximum production of 5,500 tons in 1954; it exports small amounts to neighbouring countries.

377 Output of electricity showed little increase during the war, but after the
471 war demand rose rapidly. The inability of the foreign concessionary companies operating in Damascus and Aleppo to expand capacity sufficiently fast led the
433 Government, in 1951, to nationalise them, for compensation, and to instal additional equipment; 1/ in 1954, the Homs-Hama electricity company was also nationalized. Output by public utilities has risen considerably in recent years, from 47 million kilowatt-hours in 1947 to 81 million in 1950, 114 million in 1953 and 80 million in the first eight months of 1954; output by industrial power plants is probably over 40 million kilowatt-hours per annum.

433 Other important industries include tanning, and the making of matches, cardboard, soap, nails, pins and plastics.

433 Government assistance to industry has taken four main forms: tariff
656 protection, tax exemption, financial aid and regulation of standards and prices. In the early post-war years foreign competition weighed heavily on the Syrian market. The ending of the customs union with Lebanon in 1950 (see below) led to a decrease in competition in some industries, notably spinning; but other industries, such as weaving and canning, which marketed a substantial proportion of their output in Lebanon, suffered. In recent years, protection has been greatly increased by the raising of customs duties on competing goods 2/ or by prohibiting the importing of such goods: among the prohibited articles were matches, soap, shoes, socks and stockings, glass products, canned fruits and vegetables, wooden furniture and alcoholic drinks. These measures seem to have greatly decreased foreign competition; nevertheless, in recent years, prices of local manufactures have tended to decline. 3/

1/ Between the autumn of 1951 and the end of 1953, a total capacity of 6,450 kilowatts was installed in Damascus (Al Mamar, special issue on Syrian industry, Damascus 1954); a total of £S 9.5 million was advanced by the Government to the nationalized firms for expansion and improvements. At the end of 1953, the total capacity of public utilities was 34,000 kilowatts and that of industrial power plants was over 20,000 kilowatts. Two plants with a capacity of 17,000 kilowatts were scheduled for completion at the end of 1954.

2/ For example, in 1952, duties on several types of woollen and cotton goods were raised by 25 to 50 per cent.

3/ The index of wholesale prices of domestic industrial products rose from 93 in 1950 (1949 = 100) to 111 in 1951, but declined to 103 in 1952, 88 in 1953 and 79 in the first nine months of 1954.

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Latakia, is to irrigate 5,000 hectares at a cost of £S 2.6 million; the scheme should be completed by the end of 1955. Projects under study include a scheme on the Barada River, near Damascus, to irrigate 5,000 hectares and provide a capacity of [illegible],000 kilowatts, at a total estimated cost of £S 12 million; the Yusif Pasha dam, on the Euphrates, which would extend irrigation by 100,000 hectares and provide a capacity of 45,000 kilowatts, at an estimated cost of £S 190 million; and a small multi-purpose project on the Nahr River, north of Latakia.

The most important project under way is that on the Ghab, on the Orontes north of Hama. The objective is to reclaim by drainage some 26,000 hectares of land and to irrigate by gravity a total area of 65,000 hectares, 43,000 of which had not been irrigated before.

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The project also includes the building of four hydroelectric stations, with a capacity of 20,600 kilowatts and an estimated annual output of 80 million kilowatt hours; a thermic generator with a capacity of 9,500 kilowatts; and 700 kilometres of roads. Total costs, exclusive of electric installations, are estimated at £S 140 million, of which £S 45 million are for drainage, £S 55 million for irrigation and £S 37 million for roads and bridges. The hydroelectric plants are estimated to cost another £S 17 million and the thermic plant £S 7.6 million. The Government expects to recover its outlay on the scheme by selling, for an estimated £S 150 million, 30,000 hectares of land which it owns in the region and by levying a small irrigation fee. The scheme is expected to raise gross agricultural income by £S 91 million and net income by £S 78 million. Completion is scheduled for 1960. 1/

The Ghab Project Administration was established in 1951, and in 1953 it was authorized to borrow £S 25 million from the Banque de Syrie et du Liban, at 2 per cent interest. A firm of Netherlands consultants, hired by the Government to prepare an over-all plan for the Ghab, presented its report in May 1953. In September 1953 a contract was awarded to a Yugoslav firm for the deepening of the Orontes channel, at a cost of £S 3.3 million. It is expected that contracts for other parts of the project will be awarded soon.

The total area of irrigation projects recently completed or approaching completion is 57,000 hectares and that of schemes planned but not yet begun is 276,000. The total irrigable area, including that at present irrigated, is estimated at 750,000 hectares. 2/.

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The total cultivable area in Syria is put at 5 million hectares, of which one million are at present not cultivated, while 1.6 million are left fallow each year under the prevailing triennial rotation. Present plans call for intensifying production by using leguminous crops to replace the period of fallow,

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1/ "The Ghab Project", by Abdel Basit Khatib, Director General of the Ghab Project Administration (mimeographed document, Damascus, October 25, 1954). See also Abdel Basit Khatib Nashru al Ghab (Damascus, October 1953).

2/ Soubhi Wasicom, "Les Irrigations en Syrie", Annual Bulletin of the International Commission on Irrigation and Drainage, 1955, and "Al mashari al mia fi Suria", Al Hayat, 31 July 1954 (Beirut).